Republic of Namibia

MINISTRY OF EDUCATION, INNOVATION, YOUTH, SPORTS, ARTS AND CULTURE

NAMIBIA SENIOR SECONDARY CERTIFICATE (NSSC)

METALWORK AND WELDING SYLLABUS

ORDINARY LEVEL

SYLLABUS CODE: 6188

GRADE 10-11

For implementation in 2027
For first examination in 2028

Ministry of Education, Innovation, Youth, Sports, Arts and Culture
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Metalwork and Welding Syllabus Ordinary Level Grade 10 - 11

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1. INTRODUCTION

The Namibian Senior Secondary Certificate Ordinary (NSSCO) level is designed as a two year course for examination after completion of the Junior Secondary phase. The syllabus is designed to meet the requirements of the *National Curriculum for Basic Education (NCBE, 2018)* and has been approved by the National Examination, Assessment and Certification Board (NEACB).

The NCBE, applicable at the stage of Senior Secondary Education (Grade 10-11) and at equivalent stages of non-formal education, as a part of life-long learning, recognise the uniqueness of the learner and adhere to the philosophy of learner-centred education.

The NCBE guidelines:

- recognise that learning involves developing values and attitudes as well as knowledge and skills
- promotes self-awareness and an understanding of the attitudes, values and beliefs of others in a multilingual and a multicultural society
- encourage respect for human rights and freedom of speech
- provide insight and understanding of crucial "global" issues in a rapidly changing world which affect quality of life: HIV and AIDS, global warming, environmental degradation, mal-distribution of wealth, expanding and increasing conflicts, the technological explosion and increased connectivity
- recognise that as information in its various forms becomes more accessible, learners need to develop higher cognitive skills of analysis, interpretation and evaluation to use information effectively
- seek to challenge and to motivate learners to reach their full potential and to contribute positively to the environment, economy and society

Thus the NCBE guidelines provide opportunities for developing essential, key skills across the various fields of study. Such skills cannot be developed in isolation and they may differ from context to context according to the field of study.

Metalwork & Welding contributes directly to the development of the key skills marked*
The skills developed in Metalwork and Welding are:

- communication skills*
- information skills*
- numeracy skills*
- self-management and competitive skills*
- problem solving skills*
- social and co-operative skills*
- physical skills*
- work and study skills*
- critical and creative thinking skills*

2. RATIONALE

This syllabus is part of the technology learning area in the *NCBE* and is intended to provide a sequence in Metalwork and Welding which fosters the development of both manual and intellectual skills. The approach to the subject which is advocated in this syllabus is problem solving centred and tries to involve learners in planning, designing and executing their practical work. The overall aim is to facilitate the acquisition of technical knowledge and skills, leading to self-reliance, which is essential for daily life, further study and the world of work. Ultimately, the goal of Metalwork and Welding is to increase the technological literacy of learners

3. AIMS

The aims of the syllabus are the same for all learners. They are set out below and describe the educational purposes of a course in Metalwork and Welding for the NSSC examination. They are not listed in order of priority.

The aims are to:

- extend and deepen knowledge and understanding relating to design, welding principles, practical activities to underpin personal engagement in the analysis and implementation of the syllabus
- provide opportunities for experiential development of artefact and implementation skills in Metalwork and Working
- develop critical abilities in the context of Metal and Welding as well as economic and moral value judgements
- develop an awareness of the significance of Metalwork and Welding in society
- provide an opportunity for the learner to initiate personally and to accept major responsibilities for the organisation and management of the artefact.

4. ADDITIONAL INFORMATION

Guided learning hours

The NSSCO level syllabuses are designed on the assumption that learners have about 130 guided learning hours per subject over the duration of two years, but this is for guidance only. The number of hours required to gain the qualification may vary according to local conditions and the learners' prior experience of the subject. *The National Curriculum for Basic Education (NCBE)* indicates that this subject will be taught for 8 periods of 40 minutes each per 7-day cycle, or 6 periods of 40 minutes each per 5-day cycle, over two years.

Prior learning

This Metalwork and Welding syllabus is designed to build on the knowledge and skills acquired in the Junior Secondary phase.

It is recommended that learners who are beginning this course should have previously studied Technical Studies A or Technical Studies B in Grade 8 - 9.

Progression

NSSCO levels are general qualifications that enable learners to progress either directly to employment as a junior or semi-skilled welder technicians or proceed to further qualifications.

Grading and reporting

NSSCO results are shown by one of the grades A*, A, B, C, D, E, F or G indicating the standard achieved, grade A* being the highest and grade G the lowest. 'Ungraded' indicates that the candidate has failed to reach the minimum standard required for a pass at NSSCO.

Support materials and approved textbooks

NSSCO syllabuses, specimen question papers, examiner reports and assessment manuals in subjects, where applicable, are sent to all schools. Approved learning support materials are available on the *SeniorSecondary Textbook Catalogue for Schools*.

5. LEARNING CONTENT

The content is divided into 9 topics which are:

1. Health, safety and first aid
2. Measuring and marking out tools
3. Hand tools
4. Power tools, machines and equipment
5. Drawing communication
6. Metals
7. Sheet metalwork
8. Joining methods
   - 8.1 Arc welding
   - 8.2 Oxy-acetylene welding
   - 8.3 Soldering
   - 8.4 Metal Inert Gas (MIG), Tungsten Inert Gas (TIG) welding
   - 8.5 Riveting
   - 8.6 Temporary Joining Methods
9. Metal finishing

TOPICS	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
1. Health, safety and first aid	• understand *National Occupational Safety Association* (NOSA) safety standards	• explain and apply the safety measures regarding NOSA with reference to: - obstruction - sharp corners or edges - loose clothing and jewellery - protection of eyes and body against radiation when welding - use of barrier cream - inadequate guards over machinery - personal safety (Personal Protective Equipment (PPE)) - workshop and environmental safety - hand tools and machinery - portable electrical equipment - gas leakage - loose lying nails, screws and bolts - earthing of electrical equipment - stacking of materials and hoisting - misuse of gases such as compressed air - flammable and toxic substances
	• know firefighting equipment	• identify firefighting equipment (fire extinguisher, fire blanket, firehose)
	• know first aid procedures	• describe basic first aid procedures including: - treatment of bleeding wounds - electric shock - ABC of first aid application (Airway, Breathing, Circulation) (possible practical activities: role plays, posters)

TOPICS	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
2. Measuring and markingout tools	• know and understand different measuring and marking out tools	• explain the following measuring and marking out tools: - measuring tape - steel rule - folding rule - engineers square - trammel - vernier calliper - micrometer - scriber - punches (center, dot,) - dividers - callipers (inside, outside, odd legged) • use the following measuring and marking out tools: - measuring tape - steel rule - folding rule - engineers square - trammel - vernier calliper - micrometre - scriber - punches (center, dot,) - dividers - callipers (inside, outside, odd legged)

TOPICS	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
3. Hand tools	• know and understand different hand tools	• explain the following hand tools and their function: - driving tools - cutting tools - holding device - shaping tools - riveting tools - thread cutting • explain the care and maintenance of hand tools (look after and fix): - driving tools - cutting tools - holding device - shaping tools - riveting tools - thread cutting • use the following hand tools: - driving tools - cutting tools - holding device - shaping tools - riveting tools - thread cutting *(use the listed tools to demonstrate filing, planing, hammering,sawing)*

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
4. Power tools, machines and equipment	• know different power tools and machines	• explain the following power tools and machines: - electric hand drill - pillar/pedestal drill - bench grinder - angle grinder - metal cut off machine (cut off tool) - jigsaw - soldering iron - spot welder (tack welding) - guillotine/metal shearer - pipe bender • use different power tools and machines: - electric hand drill - pillar/pedestal drill - bench grinder - angle grinder. - metal cut off machine (cut off tool) - jig saw - soldering iron - spot welder (tack welding) - guillotine/metal shearer - pipe bender

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
5. Drawing communication	• draw freehand sketches	• use sketches and notes to make freehand sketches/drawings of: - Metal sections • round bar • round tube • square bar • square tube • rectangular bar • rectangular tube • I beam • angle iron • flat bar • channels - simple projects/developments (like scoops) - welded joints - brackets - templates (like strip templates, flange templates, web templates) - gussets
	• produce drawings	• interpret drawings • draw isometric, oblique and exploded views of various objects • draw in first angle orthographic projection different objects/ products • draw weld symbols • label drawings

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
6. Metals	• understand sustainable design practices in Metalwork and Welding	• explain the processes of raw material extraction, production, and stock forms of metals, highlighting their impact on sustainability • apply sustainable design principles in the selection, use, and processing of metals • evaluate methods of reusing and recycling metals and by-products to reduce environmental impact in metalwork and welding projects
	• know the composition, uses and properties of different metals	• describe the composition, uses and properties of the following metals: - cast iron - mild steel - copper - brass - bronze - aluminium - tool steel/high carbon steel - high speed steel - stainless steel - duralumin - galvanized iron
	• use different metals	• use the following metals: - mild steel - galvanized iron
	• know heat treatment processes and types	• describe the heat treatment processes • describe the following types of heat treatment: - annealing - tempering - hardening - case hardening - normalising - point hardening

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
7. Sheet metalwork	• understand sheet metalwork tools and equipment	• explain the following tools and equipment: - tinsnips (straight, curved and universal) - folding bars - tin man's mallets - hammers (blocking, collet, planishing raising, tray, tray setting, paning peening, creasing) - groove punch - anvil - bench shears - bending machines - rolling machines • use the following tools and equipment: - tinsnips (straight, curved and universal) - folding bars - tin man's mallets - hammers - groove punch - anvil - bench shears - bending machines - rolling machines
	• know edges and joints	• explain the following edges and joints: - safe edge - wire edge - lap joint • make the following edges and joints: - safe edge - wire edge - lap joint

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
7. Sheet metalwork (continued)	• know the different manufacturing processes of steel profiles	• describe the manufacturing processes of steel profiles: - rolled - drawn - forged
8. Joining methods/techniques **8.1 Arc welding**	• understand alternating current (AC) and direct current (DC) welding machines	• distinguish between AC and DC welding machines (oil and air cooled, AC and DC)
	• understand arc welding	• state advantages of electric arc welding • describe types and parts of electrodes • explain the advantages of flux on electrodes • describe welding techniques
	• illustrate arc welding process and symbols	• interpret welding symbols • apply welding symbols • illustrate the cross-section of the arc-welding process showing the weld metal and weld pool (molten pool)
	• use tack welding techniques on joints	• explain tack welding • apply tack welding on the following joints: - butt joints - corner joint - T-joint - lap joint

8.1 Arc welding (continued)	• understand the causes and remedies of welding defects	• explain the causes of the following welding defects: - under cut - porosity - incomplete penetration - spatter • explain the remedies for the following defects: - under cut - porosity - incomplete penetration - spatter
	• test welds	• explain weld testing processes (destructive, non-destructive tests) • test welds (destructive, non-destructive tests)
8.2 Oxy-acetylene welding	• understand the safety rules and precautionary measures of the oxy- acetylene equipment	• explain the precautionary measures and safety rules to be taken into consideration when operating oxyacetylene in terms of: - storage - handling - maintenance - difference in screw threads and colour identification (cylinders) - dangers and causes of back flashing and backfiring - testing of gas leaks - cutting torch and nozzles - hoses - flashback arrestors - valve spanner - blowpipe - nozzle - spark lighter - opening and closing procedures

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
8.2 Oxy-acetylene welding (continued)	• understand heat joining techniques	• describe the following aspects in heat joining: - gas welding (brazing, silver soldering - general care of blowtorch/nozzle - use of flux - welding precautions - filler rods - work piece preparations - leftward (forward welding) - rightward welding (backward welding) - fillet welding • apply the following aspects in heat joining: - gas welding (brazing, silver soldering - flame adjustments - general care of blowtorch/nozzle - use of flux - welding precautions - filler rods - work preparations - leftward (forward welding) - rightward welding (backward welding) - fillet welding
8.3 Soldering	• know soldering as a permanent joining method.	• explain three types of soldering: - soft soldering - silver soldering - brazing • Apply soldering with the use of a soldering iron and blow torch

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
8.4 Metal Inert Gas (MIG) and Tungsten Inert Gas (TIG) welding.	• know TIG and MIG welding as permanent joining methods.	• distinguish between MIG and TIG welding components. • describe the process of MIG and TIG welding.
8.5 Riveting	• know and understand riveting as a permanent joining method	• explain specifications of: - solid rivets - pop rivets • apply: - solid rivets - pop rivets
8.6 Temporary joining methods	• know temporary joints	• explain the following temporary joining methods and distinguish between them: - screwing (types of screws) - bolting (types of studs, bolts and nuts, washers)
9. Metal finishing	• know suitable finishes	• discuss the purpose of metal finishing • explain the following finishing procedures: - filing - use of abrasives (sand paper and emery cloth) - painting - bluing - galvanizing - buff polishing - metal plating - grinding - sand blasting - coating (dip coating, enamel coating, electro plating)

TOPIC	GENERAL OBJECTIVES *Learners will:*	SPECIFIC OBJECTIVES *Learners should be able to:*
9. Metal finishing (continued)	• know suitable finishes	• apply the following finishing procedures: - filing - use of abrasives (sand paper and emery cloth) - painting - bluing - galvanizing - buff polishing - metal plating - grinding - sand blasting - coating (dip coating, enamel coating, electro plating)

6. ASSESSMENT

6.1 Assessment objectives

The four assessment objectives are:

A Knowledge with understanding
B Problem solving
C Interpretation of data
D Practical skills

A description of each assessment objective follows. Under each assessment objective a list is given of the skills a learner should be able to demonstrate.

A Knowledge with understanding

Learners should be able to

- demonstrate the ability to state facts, recall and name items, recall and describe processes
- demonstrate the ability to apply and relate knowledge to design
- make reasoned arguments and anticipate consequences of the outcomes of the design and practical process
- demonstrate a critical awareness of the interrelationship between metalwork and the needs of society

B Problem solving

Learners should be able to

- analyse a problem by considering relevant functional, aesthetic, human, economic and environmental factors and draw up specifications
- investigate, research, collect and record relevant data
- generate a range of outline solutions to a identified problem, giving consideration to the constraints of time, cost, skills and resources
- develop, refine, test and evaluate the effectiveness of the solutions

C Interpretation of data

Learners should be able to

- interpret data in one form and where necessary change it into an applicable form
- interpret and produce data in a variety of forms such as charts, diagrams, graphs, flow charts and drawing
- propose, develop and represent ideas in a detailed form, shape construction, movement, size and structure through graphical representation and three dimensional modelling

D Practical skills

Learners should be able to

- plan and organise procedures involved in the making of an artefact
- select from a range of resources, appropriate for the making of the artefact
- demonstrate appropriate manipulative skills by showing an understanding of resources, in relation to their use
- test and evaluate the product in terms of aesthetic, function and technical quality

6.2 Scheme of assessment

Learners must be assessed for Paper 1, Paper 2 (Practical examination) and Paper 3 (artefact and portfolio).

Differentiation

All learners are expected to pursue the same curriculum content and differentiation will be by outcomes.

Description of papers

Paper 1

Written	**2 hours**	**100 marks**	**Weighting: 50%**

This paper will consist of two sections, A and B.

Section A will consist of **ten** short answer questions of variable length for a total of **30 Marks**. Section B will consist of **seven** structured questions for a total of **70 marks**.

Paper 2

Practical Examination	**3 hours**	**50 Marks**	**Weighting: 25%**

Each learner will undertake a practical examination which is a compulsory component to assess practical skills. The practical examination will be internally marked and externally moderated by DNEA.

Paper 3

Artefact and Portfolio	**4 trimesters**	**50 Marks**	**Weighting: 25%**

Learners will undertake an identified project supplied by DNEA. The project will be internally marked and externally moderated by DNEA.

Learners will be expected to demonstrate practical skills. The work presented for assessment will typically be in the form of an A3 size folder. The made artefact should be according to scale inthe folder.

The portfolio should include photographic evidence of the 'made product'. (See external moderation section for the assessment criteria for the course work).

The learners must commence with their project in the second trimester of Grade 10 and complete it by the end of the second trimester of Grade 11, to be ready for submission to DNEA at the beginning of the third trimester of grade 11.

6.3 Specification grid

Assessment objectives	Paper 1 Marks	Paper 2 Marks	Paper 3 Marks	Overall weighting of papers
A Knowledge with understanding	60	-	-	30%
B Problem solving	20	-	15	17,5%
C Interpretation of data	10	10	15	17,5%
D Practical skills	10	40	20	35%
Total marks	**100**	**50**	**50**	**200**
Weighting	50%	25%	25%	100%

The assessment objectives are weighted to give an indication of their relative importance. They are not intended to provide a precise statement of the number of marks allocated to a particular assessment objective.

6.4 Grade descriptions

Learners who have followed this curriculum are eligible for the award of grades A* to G.

The candidate is likely to have shown the ability to:

	A	C	E	G
	Excellent ability to	**Good ability to**	**Some ability to**	**Limited ability to**
Knowledge and understanding	• identify detailed facts and techniques in relation to the content of the syllabus	• identify facts and techniques accurately in relation to the content of the syllabus	• identify basic facts and techniques accurately in relation to the content of the syllabus	• identify basic facts accurately in relation to the content of the syllabus
	• describe / explain / define the theories and principles of the syllabus in detail	• describe / explain / define clearly the theories and principles of the syllabus	• familiarity with the basic theories and principles of the syllabus	• be familiar with the basic principles of the syllabus
Problem solving	• analyse and evaluate problems and situations	• analyse and evaluate problems and situations	• identify and define / describe problems and situations	• identify problems and situations
	• use judgement to structure / create effective plans of action	• use judgement to structure / create appropriate plans of action	• structure / create reasonable plans of action	• suggest solutions

	A	C	E	G
	Excellent ability to	**Good ability to**	**Some ability to**	**Limited ability to**
Interpretation of data	• communicate information, ideas and processes (and solutions) in detail	• communicate information, ideas and processes (and solutions)	• communicate information, ideas and processes (and solutions)	• communicate information, ideas and processes (and solutions)
	• choose the most appropriate method to communicate in different situations	• choose appropriate methods to communicate in different situations	• choose communication methods for different situations	• choose different communication methods
	• interpret and handle information appropriately	• interpret and handle information adequately	• interpret and handle information	• handle information
Practical skills /Realisation	• apply a plan / specification effectively and systematically	• apply a plan / specification accurately and adequately	• apply a plan / specification	• apply a plan / specification
	• manage resources effectively	• manage resources	• manage resources	• manage resources
	• use equipment and tools effectively	• use equipment and tools appropriately	• use equipment and tools	• use equipment and tools
	• demonstrate correct techniques	• demonstrate appropriate techniques	• apply techniques	• be familiar with techniques
	• apply numerical skills effectively	• apply numerical skills appropriately	• apply numeric skills	• apply numeric skills
	• adhere to safety measures	• adhere to safety measures	• adhere to safety measures	• be familiar with safety measures
	• evaluate work and progress	• monitor and comment on work and progress	• comment on their work	• make basic comments about their work

6.5 GLOSSARY OF COMMAND WORDS

Analyse	examine in detail to show meaning, identify elements and the relationship between them
Calculate	work out from given facts, figures or information
Classify	to assign things or people to classes or groups
Compare	identify/comment on similarities and/or differences
Conceptualise	to arrive at a concept or generalization as a result of things seen experienced or believed
Contrast	identify/comment on differences
Define	give precise meaning
Demonstrate	to show or prove something clearly and convincingly
Describe	state the points of a topic / give characteristics and main features
Determine	use the information given to work out the answer
Develop	take forward to a more advanced stage or build upon given information
Discuss	write about issue(s) or topic(s) in depth in a structured way
Display	to make something visible or available for others to see
Distinguish	show the difference between one or more variables
Evaluate	judge or calculate the quality, importance, amount, or value of something
Explain	set out purposes or reasons / make the relationships between things evident / provide why and/or how and support with relevant evidence
Give	produce an answer from a given source or recall/memory
Identify	name/select/recognise
Interpret	reasoning or some reference to theory, depending on the context
Investigate	examine a problem in a systematic way
Justify	support a case with evidence/argument
List	give a number of points, generally each of one word
Outline	set out main points

Relate	find the relationship between one or more variables
Report	to give information about something that has happened
Research	methodical investigation into a subject in order to discover facts, to establish or revise a theory or to develop a plan of action based on the facts discovered
Select	choose from a number of alternatives
Sketch	make a simple freehand drawing showing the key features, taking care over proportions
State	express in clear terms
Suggest	apply knowledge and understanding to situations where there are a range of valid responses in order to make proposals

7. GLOSSARY OF TERMS

Aesthetics	how something looks, especially when considering how pleasing it is
Axonometric	used to describe a method of drawing a 3-dimensional object so that the vertical and horizontal axes are drawn to scale but the curves and diagonals appear distorted
Communication (graphical)	the exchange of information between individuals, by means of speaking or using a system of signs or behaviour (drawing)
Computer Aided Drafting (CAD)	drawing with the help of a computer
Computer Aided Manufacturing (CAM)	producing with the help of a computer
Ergonomics	the study of how a workplace and the equipment used there can best be designed for comfort, safety, efficiency and productivity
Media	the various means of mass communication thought of as a whole, including radio, television, magazines and newspapers, together with the people involved in their production
Oblique	sloping or joining something at an angle that is not a right angle
Pictorial	containing illustrations or photographs as opposed to written text (3-dimentional sketches)
Principle	the basic way something works
Recognise	be aware of a fact or problem
Scale	a ratio representing the size of an illustration or reproduction, especially a map or a model, in relation to the object it represents
Specification	a detailed description of a particular thing, especially one detailed enough to provide somebody with the information needed to make that thing
Technology	scientific knowledge used in practical ways in industry
Time management	to plan and execute a task within a given period
Triangulation	a navigation technique that uses the trigonometric properties of triangles to determine a location or course by means of compass bearings from two points a known distant apart.
Wasting	take away or remove

ANNEXE A: PRACTICAL ASSESSMENT CRITERIA

Assessment Objectives	Level of Response	Mark Range	Max. Mark
1. Planning	limited general knowledge and inaccurate description of items outlined in the syllabus	0-1	5
	describe with accuracy and understanding a wide range of items outlined in the syllabus	2-3	
	excellently demonstrate a detailed knowledge of syllabus content presented in a variety of contexts	4-5	
2. Interpretation of data	convey information using elementary technical vocabulary	0-1	5
	convey information using appropriate technical vocabulary	2-3	
	convey information appropriately, precisely and concisely	4-5	
3. Practical skills	tools not fully utilised and properly used, safety compromised , low accuracy, low quality of product and not fully completed	0-11	35
	tools used satisfactory, safe use of tools and equipment satisfactory, safety precautions satisfactory, accuracy is sometimes compromised and quality of the product is average	12-23	
	excellent and safe use of tools and equipment most of the time, safety precautions are observed, learner worked accurately most of the time and delivered a product of high quality	24-35	
4. Evaluation	no or very cryptic evaluation that does not really say anything	0-1	5
	learner reflected on the process but did not mention what was wrong or could be done different	2-3	
	learner reflected on the process, highlighted challenges and mentioned what could be done different	4-5	
		Total	**50**

ANNEXE B: METALWORK AND WELDING PRACTICAL EXAMINATION ASSESSMENT SUMMARY FORM

Please read the instructions printed overleaf <u>before</u> completing this form.

Centre number					Centre name		November	2	0		

Candidate number	Candidate name	Teaching group/ set	**Part A**	**Part B** Making (max 40)		**Part C**	**Total mark**	**Internally moderated mark**
			Short questions (max 5)	Interpretation of data (max 5)	Practical skills (max 35)	Evaluation (max 5)	**(max 50)**	**(max 50)**

Name of subject teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

ANNEXE C: COURSEWORK ASSESSMENT CRITERIA

Criterion	Level of Response	Mark Range	Max. Mark
1. Generation and exploration ofideas	a limited range of ideas with a tendency to focus on a single concept; little or no evaluation of ideas	0-1	**5**
	a range of appropriate solutions proposed. ideas examined with evaluations leading to the identification of possible ideas for development	2-3	
	a wide range of appropriate solutions with imaginative interpretation; detailed evaluation of ideas and consideration of the requirements of the specification	4-5	
2. Development of proposedsolution	some decisions made about form, metal and/or construction methods; a working drawing with little detail	0-1	**5**
	appropriate decisions made about form, metal and construction details/ production methods; evidence of some testing and/or trialing; a simple plan showing awareness of the main processes involved;	2-3	
	appropriate testing and trialing resulting in reasoned decisions about form, materials, construction/production methods and other items	4-5	
3. Planning for production	limited evidence of any forethought;	0-3	**10**
	satisfactory planning showing an order for the sequence of operations; satisfactory working drawing showing overall layout and major dimensions	4-6	
	clear and detailed planning showing an effective order for the sequence of operations; time schedule of production, tools and materials. clear and detailed working drawings and other information giving full details of final product	7-10	
4. Product realisation	exhibit a reasonable standard of outcome, be mainly complete and satisfy some aspects of the specification	0-7	**25**
	some minor inaccuracies and blemishes; complete and functioning as intended	8-16	
	completed to a high standard of outcome with precision and accuracy; fully meet the requirements of product specification	17-25	
5 Testing and Evaluation	little or no evidence of testing; general overall appraisal with little reference to the specification	0-1	**5**
	appropriate reporting and/or comment on simple testing; reference to specifications with some conclusions leading to possible modifications or improvements	2-3	
	objective testing with reference to specifications and user; detailed and meaningful conclusions leading to proposals for further development.	4-5	
		Total	**50**

MODERATION

(a) Internal moderation

When several teachers in a centre are involved in internal assessment, arrangements must be made within the centre for all learners to be assessed to a common standard.

It is essential that within each centre the marks for each skill assigned within different teaching groups (e.g. different classes) are moderated internally for the whole centre entry. The centre assessments will then be subjected to external moderation.

(b) External moderation

Coursework assessment summary forms must be received by DNEA along with samples of the coursework undertaken by the learners and the schemes of assessment for each assignment. The samples should cover the full ability range. If there are ten or fewer learners, all the coursework that contribute to the final mark for all learners must be sent to DNEA. Where there are more than ten learners, all the coursework that contribute to the final mark for ten of them will be required. The centre should select learners covering the whole mark range, with the marks spaced as evenly as possible, from the top mark to the lowest mark. If appropriate, the samples should be selected from the classes of different teachers. A further sample of coursework may subsequently be required. All records and supporting work should be retained untilafter the publication of the results.

The Directorate of National Examination and Assessment (DNEA) will issue instructions to centres in Namibia concerning external moderation arrangements.

ANNEXE D: METALWORK AND WELDING COURSEWORK ASSESSMENT SUMMARY FORM

Please read the instructions printed overleaf <u>before</u> completing this form.

Centre number					Centre name		November	2	0		

Candidate number	Candidate name	Teaching group/ set	Generation and exploration of ideas (max 5)	Development of proposed solution (max 5)	Planning for production (max 10)	Product realisation (max 25)	Testing & evaluation (max 5)	**Total marks (max 50)**	**Internally moderated marks (max 50)**

Name of subject teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

A. INSTRUCTIONS FOR COMPLETING COURSEWORK ASSESSMENT SUMMARY FORMS

1. Complete the information on top of the form.
2. List the candidates in an order which will allow ease of transfer of information to a computer-printed coursework mark sheet MS1 at a later stage (i.e., in candidate index number order, where the list is known; see item B.1 below). Show the teaching group or set for each candidate. The initials of the teacher may be used to indicate a group or set.
3. Transfer each candidate's marks to this form as follows**:**
   (a) Where there are columns for individual skills or assignments enter marks initially awarded (i.e. before internal moderation has taken place).
   (b) In the column headed 'Total Mark', enter the total mark awarded before internal moderation has taken place.
   (c) In the column headed 'Internal Moderated Mark', enter the total mark awarded ***after*** internal moderation has taken place.
4. Both the teacher completing the form and the internal moderator (or moderators) should check the form and complete and sign the bottom portion.

B. PROCEDURES FOR EXTERNAL MODERATION

1. The Directorate of National Examinations and Assessment (DNEA) sends a computer-printed coursework mark sheet MS1 to each centre showing the names and index numbers of each learner. Transfer the total internally moderated mark for each learner from the Coursework Assessment Summary Form to the computer-printed Coursework mark sheet MS1.
2. The top copy of the computer-printed coursework mark sheet MS1 and samples of the candidates' work covering the full ability range must be dispatched in the specially provided envelope to reach the DNEA, on date to be announced officially.
3. Indicate the candidates who are in the sample by means of an asterisk (*) against the candidates' names on the overleaf. The size of the coursework sample should be as follows:

Number of candidates entered	***Number of candidates whose work is required***
0 - 10	All candidates
11 - 50	10
51 - 100	15
above 100	20

4. Where more than one teacher is involved in marking the work, the sample must include candidates marked by all teachers. Candidates must be selected so that the whole range is covered, with marks spread as evenly as possible from the top mark to the lowest mark.
5. DNEA reserves the right to request further samples of coursework.
6. Send with the sample work records of the centre's criteria for the award of marks and information as to how internal moderation was carried out.

ANNEXE E: LIST OF TOOLS, EQUIPMENT AND MATERIALS

Measuring and marking out tools

- steel rule
- folding rule
- tape measure
- engineer square
- scriber
- dot punch
- centre punch
- inside callipers
- outside callipers
- odd leg callipers
- dividers
- combination set
- vernier callipers
- micrometre
- compass

Basic hand tools

- files and rasps
- saws
- hammers and mallets
- boring tools
- screwdrivers
- pincers
- pop rivet gun
- taps and dies
- tinsnips
- side cutter 200mm
- soldering iron
- anvil
- chisel flat 25mmx 250mm

Holding tools

- clamps
- bench vices
- hand vice
- folding bar
- chipping hammer
- wire brush
- crocodile clamp
- magnetic clamp

Machines

- electrical hand drill
- pillar drill machine
- pedestal drilling machine
- welding machine
- angle grinder
- centre lathe
- guillotine
- pedestal grinder

- pipe bender
- tig welder
- mig welder
- set of oxy-acetylene welding equipment

Materials

- first aid kit
- expanded metal mesh 1,2mm x 1,2m x 3,2m
- abrasive paper [fine, medium and coarse]
- masking tape 12mmx40m Folding bar
- mild steel sheet 2mm x 1.2m x 3.2m
- bolts and nuts
- soldering wire 0.9mm 500g punches
- flat bars 3-5mm x 20-40mm x 6m
- round tubing 2mm or more x 19-40mm x 6m
- welding electrode
- gas welding rods
- brazing rods
- soft solder
- flux
- square tubing 2mm x 19-32mm x 6m
- angle iron 2.5mm-30mmx6m
- round bars 6-10mm x 6m
- galvanised sheet 0.4-2mm x 1.2m x 3.2m

any suitable material size can be used that will suite the task given

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